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(54) **Control device with mode selector**

(57) A regulating element, in the form of a manual control stick 2, is actuable about pivot axes 3 for controlling the longitudinal movement of a motor vehicle and has an integral changeover button 4 which changes the function of the element actuation between acceleration/deceleration control in a solely forward driving mode, to forward/reverse control in a manoeuvring mode. The vehicle speeds achievable in manoeuvring mode are preferable lower than in driving mode. A standing brake function operates at the mid point of the range of actuation of the element 2. The element 2 may operate using deflection or torque, and it may provide feedback of the driving dynamics to the driver. The element 2 may also control the vehicle steering, and an additional button may provided for activating a reverse mode.

Fig. 1

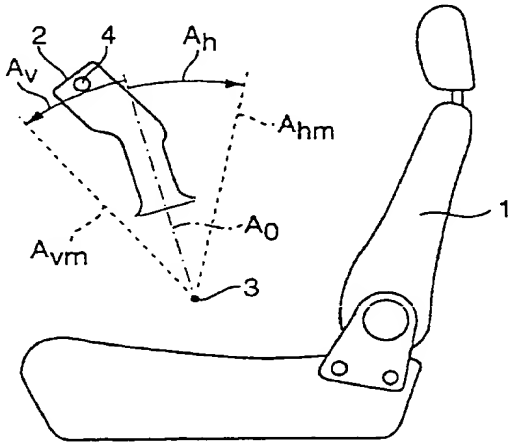

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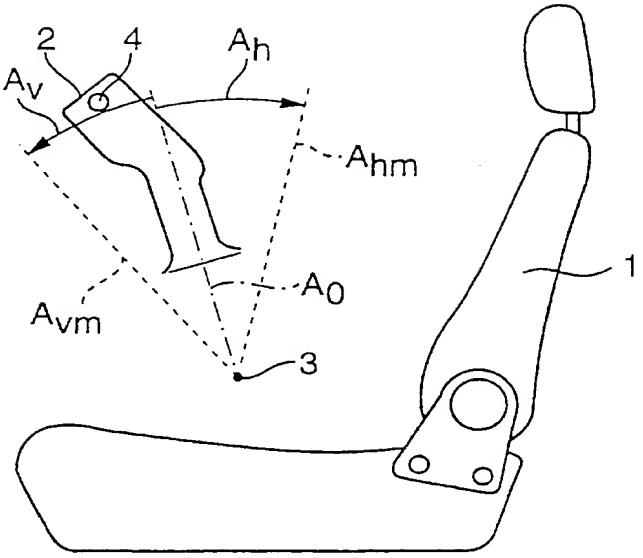
Fig. 1



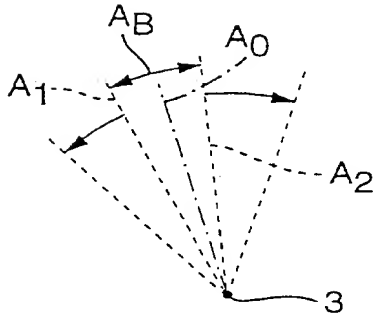


Fig. 2

Fig. 3

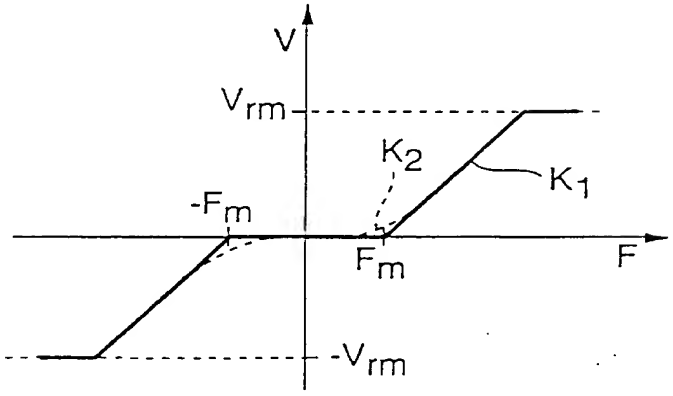


Fig. 4

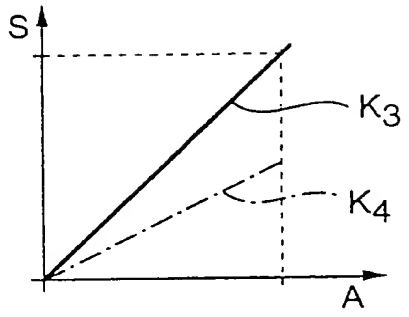


Fig. 5

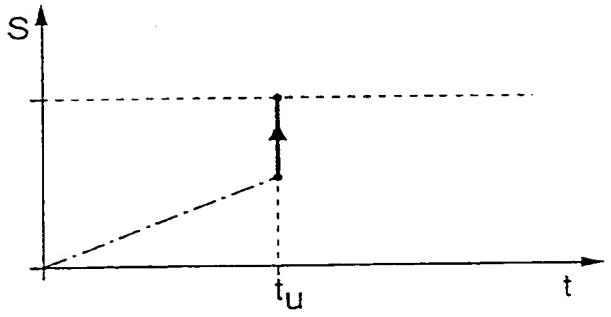


Fig. 6

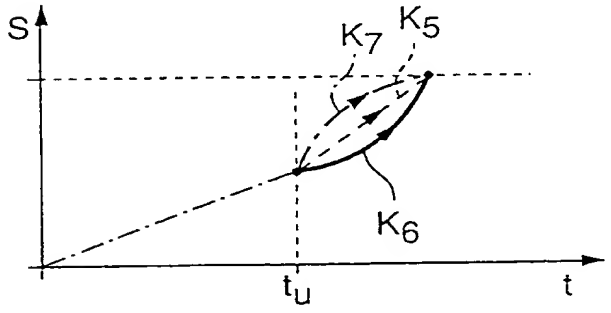
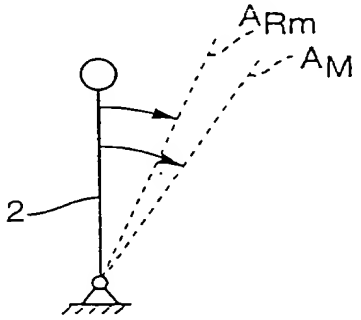


Fig. 7



A device for controlling the longitudinal movement of a motor vehicle

The invention relates to a device for controlling the longitudinal movement of a motor vehicle, with a user-actuable regulating element which controls the longitudinal movement of the vehicle with both an accelerating and a decelerating effect.

In devices of this type, the user-actuable regulating element, which is designed preferably as a control stick capable of being operated with one hand, serves, instead of a conventional accelerator and brake pedal assembly, as a user interface for controlling the longitudinal speed of the vehicle, specifically both for increasing and decreasing the latter. If required, the regulating element may additionally serve for controlling the transverse movement of the vehicle, that is to say for steering the vehicle. Arrangements of this type are described in the patent specification US 3,022,850 and in the publication by H. Bubb, Arbeitsplatzfahrer - eine ergonomische Studie [Workstation Driver - an ergonomic study], Automobil-Industrie [Automobile Industry] 3/85, page 265. Preferably, during forward driving, an actuation of the regulating element in a first direction of actuation, for example forwards, brings about a speed increase and an actuation in an opposite second direction of actuation, that is to say, for example, backwards, brings about a speed reduction, so that the actuation of the regulating element corresponds intuitively to the vehicle behaviour required by the driver. The speed to be set or the positive acceleration or negative acceleration, that is to say deceleration, to be set is fixed according to a predetermined characteristic as a function of the deflection of the regulating element or of the actuating force exerted on the regulating element.

The said obvious assignment of the direction of actuation of the regulating element to the desired vehicle behaviour may be unsatisfactory for vehicles which can be

driven not only forwards, but also backwards. For if the functionality of the forward driving mode is maintained for the regulating element for the purpose of reversing, the intuitive relationship between the direction of actuation of the regulating element and the effect on the vehicle dynamics is lost on account of the opposite direction of movement of the vehicle, that is to say an actuation of the regulating element in the direction of movement of the vehicle would then not bring about an increase, but a decrease in the reversing speed.

German patent application 19600140.4, not previously published, proposed, as a remedy, a regulating element arrangement for controlling the longitudinal speed and/or the steering angle of a motor vehicle, in which arrangement the assignment of the speed increase function and of the speed reduction function respectively to the first and second direction of actuation of the regulating element is inverted during reversing in comparison with that during forward driving. This ensures that, both during forward driving and during reversing, an actuation of the regulating element in the direction of movement of the vehicle brings about a speed increase and an actuation of the regulating element in the opposite direction brings about a speed reduction, whilst an automatic changeover may be provided between these assignments when the reverse gear of a vehicle transmission is engaged and disengaged.

Irrespective of whether such a change of assignment is or is not provided in the conventional arrangements with a uniform regulating element for controlling the entire longitudinal dynamics of the vehicle, it is necessary, at all events, for a further operating element, conventionally a gear-shift lever, to be actuated during the change between forward driving and reversing.

The present invention seeks to provide a device of the type mentioned in the introduction, by means of which the longitudinal dynamics of the vehicle can be controlled with high operating comfort both during forward driving and

during reversing.

According to the present invention there is provided a device for controlling the longitudinal movement of a motor vehicle, with a user-actuable regulating element, by means of which the longitudinal movement of the vehicle is controllable with both an accelerating and a decelerating effect, wherein

- a forward driving mode and a manoeuvring mode are provided as selectable driving modes for the motor vehicle, the vehicle
- in the forward driving mode being capable of being moved solely forwards and, when the regulating element is actuated in a first direction of actuation, being accelerated to an extent dependent on the deflection of or actuating force applied to the regulating element and, when the regulating element is actuated in a second direction of actuation, being decelerated to an extent dependent on the deflection of or actuating force applied to the regulating element, and
- in the manoeuvring mode, being capable of being moved forwards when the regulating element is actuated in one direction of actuation and of being moved backwards when the latter is actuated in the other direction of actuation.

In this device, at least two selectable driving modes, between which the vehicle driver can change over, are provided, specifically a forward driving mode and a manoeuvring mode. In the forward driving mode, the longitudinal movement of the vehicle is controlled via a user-actuable uniform regulating element with both an accelerating and decelerating effect. In the manoeuvring mode, the vehicle can be moved selectively in the forward direction or the backward direction solely as a function of the actuation of the uniform regulating element, for example in that forward driving is activated by actuating the regulating element forwards and reversing is activated when the regulating element is actuated backwards. Thus, during manoeuvring, an associated gear selector lever does not have

to be actuated whenever there is a change between forward driving and reversing. Consequently, a reversing stage does not need to be provided for a gear selector lever which may be present, since the corresponding actuation of the regulating element controlling the longitudinal movement of the vehicle already induces the selection of reverse gear in the transmission. The changeover between the forward driving mode and the manoeuvring mode which is to be carried out by the driver, for example via a corresponding operating button, brings about the associated changeover between the control functions of the regulating element which are different in the two driving modes.

In a preferred embodiment, the maximum speed which can be reached in the manoeuvring mode is kept lower than the maximum possible speed which can be reached by the vehicle in the forward driving mode. Preferably, the maximum speed in the manoeuvring mode is markedly lower than the maximum speed of the vehicle, in order to restrict the manoeuvring mode to the manoeuvring of the vehicle at low speeds, for example lower than 20 km/h.

In a further embodiment of the device, a standing brake function which brings the vehicle to a standstill or keeps it standing is active in a middle range of actuation of the regulating element. Only when the regulating element is actuated beyond this range is the vehicle moved forwards or backwards, depending on the direction of actuation of the regulating element. The provision of the range of actuation of the regulating element together with a standing brake function allows transitions which are smooth in terms of driving dynamics between forward driving and reversing phases during manoeuvring.

In a further embodiment of the device, a third driving mode in the form of a reversing mode is provided, which may likewise be selected by the driver via a corresponding operating element and in which the vehicle can be moved solely in reverse. The user-actuable regulating element for controlling the longitudinal movement of the

vehicle serves, in this case, both for increasing and for decreasing the reversing speed, whilst the assignment between the direction of actuation of the regulating element for increasing and decreasing the vehicle speed may be identical to that of the forward driving mode or else be inverted relative to this.

A further development of the invention relates to advantageous possibilities for assigning the respective actuation of the regulating element to the variable activated thereby and determining the driving dynamics, with the aid of predetermined characteristics which are selected so as to be steeper for the forward driving mode than for the manoeuvring mode. In this way, with the regulating element being actuated in the same way, the longitudinal movement of the vehicle may be set more sensitively in the manoeuvring mode than in the forward driving mode. In a further refinement of this, there is a change, which is instantaneous or is gradual according to predetermined transition characteristics, from the previous value to the new value of the control variable influenced by the actuation of the regulating element, during the changeover between the forward driving mode and the manoeuvring mode. The change in the driving speed during such changeover operations can consequently be predetermined in the way desired in each case.

Preferred embodiments of the invention are illustrated in the drawings and are described below. In the drawings:

Figure 1 shows a diagrammatic side view of a driver's seat region of a motor vehicle with a uniform regulating element for controlling the longitudinal movement of the vehicle in operating functionality for the forward driving mode,

Figure 2 shows a diagrammatic functional illustration of the regulating element of Figure 1 in operating functionality for the manoeuvring mode,

Figure 3 shows a diagrammatic illustration of the vehicle

speed as a function of the actuating force of the regulating element in the manoeuvring mode,

Figure 4 shows a diagrammatic illustration of possible regulating element characteristics in the forward driving mode, on the one hand, and in the manoeuvring mode, on the other hand,

Figure 5 shows a diagram to illustrate an instantaneous control variable transition during a change from the manoeuvring mode to the forward driving mode,

Figure 6 shows a diagram to illustrate a gradual control variable transition during a change from the manoeuvring mode to the forward driving mode, and

Figure 7 shows a diagrammatic side view of a regulating element to illustrate a kick-down function.

Figure 1 shows a diagrammatic side view of the region of a driver's seat 1 of a motor vehicle which, for controlling its longitudinal movement, specifically both in terms of acceleration operations and in terms of deceleration operations, contains a regulating element 2 which can be actuated manually by the user and can be actuated about an imaginary pivot axis 3. Depending on the system design, this actuation may involve subjecting the regulating element to torque and/or a pivoting movement of the regulating element 2 about the pivot axis 3. In this case, a distinction is conventionally made between a passive, an isometric and an active system design. In the passive system design, the control variable, that is to say the driving dynamics variable controlled by the actuation of the regulating element, is set as a function of the deflection of the regulating element, for which purpose the regulating element 2 is then articulated pivotably about the pivot axis 3. In the isometric system design, the regulating element 2 remains fixed, and the control variable is set as a function of the torque about the pivot axis 3 acting on the regulating element 2. In the active system design, torque subjection and regulating element deflection are combined, in that the torque exerted on the regulating

element 2 determines the value of the control variable and simultaneously the regulating element 2 is automatically deflected by the system as a function of the respective actual value of the control variable. In an alternative active system design, the value of the control variable is set as a function of the deflection of the regulating element and a reaction force on the regulating element 2 is generated by the system, the said reaction force being fixed as a function of the actual value of the control variable. Consequently, with the active system design, the driver receives feedback on the effect of his actuation of the regulating element on the driving dynamics, the said feedback being capable of being experienced by his hand which actuates the regulating element 2.

The acceleration or deceleration or the speed of the vehicle or else the throttle-flap angle of an internal combustion engine or the braking force may be adopted, as required, as a control variable which influences the longitudinal movement of the vehicle and which is influenced by the actuation of the regulating element. Without any restriction to generality, the throttle-flap angle or the braking force is assumed as a control variable S and the regulating element deflection A is assumed as the associated actuation of the regulating element for the further description, unless otherwise stated.

The motor vehicle can be driven in a changeover manner selectively in a forward driving mode and a manoeuvring mode by the vehicle driver. To change over between these driving modes, there is provided on the regulating element 2 an associated changeover button 4 which can be actuated comfortably, for example, by the thumb of the hand grasping the regulating element 2. Figure 1 shows the operating functionality of the regulating element 2 for the forward driving mode. Positive deflections A_f of the regulating element 2 in the direction of the vehicle front, that is to say forwards, are assigned driving dynamics actions which increase the driving speed, that is to say

accelerate the vehicle, whilst regulating element deflections A_b in the direction of the vehicle rear, that is to say backwards, result in decelerating driving dynamics actions. The direction of actuation of the regulating element therefore corresponds to the vehicle behaviour intuitively desired by the driver. In particular, this means that, with an increasing deflection of the regulating element out of a middle position of rest A_o forwards as far as maximum deflection A_{fm}, the throttle-flap angle is opened up to the maximum value, so that the vehicle is accelerated up to its maximum speed. Similarly, an increasing actuation of the regulating element out of the position of rest A_o backwards as far as maximum deflection A_{bm} corresponds to an increasing braking effect until a maximum possible vehicle deceleration is reached.

During the changeover from the forward mode to the manoeuvring mode, this operating functionality of the regulating element 2 changes to a functionality, such as is illustrated in Figures 2 and 3. As long as, in the manoeuvring mode, the regulating element deflection out of the position of rest A_o does not exceed a predetermined range A_R about this position of rest A_o, the regulating element 2 keeps active a standing brake function which ensures that the vehicle is braked to a standstill or is kept at a standstill. Only when the regulating element deflection exceeds in one direction or the other this range A_R of low regulating element deflections, the said range being defined by corresponding limit points A_1, A_2, is the vehicle accelerated forwards or backwards, shift points provided at the limit points A_1, A_2 ensuring that the standing brake function is deactivated automatically. When the regulating element 2 is actuated forwards, a shift transmission present in the vehicle is induced to select a forward gear via a control unit not shown, to which the information on the regulating element deflection is supplied, whilst, in contrast to this, when the regulating element 2 is actuated backwards in its operating

functionality for the manoeuvring mode, this control unit automatically brings about the selection of a reverse gear, without the driver having to operate a further operating element, for example a gear selector lever, for this purpose. In the manoeuvring mode, therefore, an automatic changeover between forward driving and reversing phases is achieved.

Figure 3 illustrates the driving dynamics in the manoeuvring mode with the aid of a diagram, in which the vehicle speed v is plotted as a function of the actuating force F exerted on the regulating element 2, the characteristic K_1 represented by an unbroken line indicating the assumption that the regulating element 2 is arranged pivotably about its position of rest A_o in a spring-centred manner. As long as the amount of actuating force F does not exceed a specific minimum value F_m, the regulating element 2 is located in its range A_R of low deflections, so that the standing brake function is active and the vehicle is at a standstill. With an increasing actuating force F, the vehicle then moves with increasing speed v forwards or backwards, depending on the direction of actuation of the regulating element, in each case at most up to a maximum manoeuvring speed v_{Mm} which is selected so as to be very low in comparison with the maximum possible vehicle speed. In order to make the run-up from a standstill smoother, the spring centring of the regulating element 2 is preferably not selected as kinked in the run-up range, as in the case of the characteristic K_1, but smoothed, thus then resulting in the characteristic K_2, marked by a broken line in Figure 3, for the profile of the vehicle speed as a function of the actuation force of the regulating element.

If required, an additional third driving mode in the form of a reversing mode, which may likewise be selected by the driver by a corresponding actuation of the regulating element, may be provided for the motor vehicle. This reversing mode is assigned, for the regulating element 2, the same operating functionality as in the forward driving

mode, that is to say acceleration operations are initiated in one direction of actuation and deceleration operations in the other, the difference being that, in this case, a reverse gear is permanently selected in the transmission. In addition to identical operating functionality, operating functionality inverted relative to that of the forward driving mode may also be provided for the reversing mode, so that backward actuations of the regulating element then bring about accelerations of the vehicle in the backward direction and forward actuations of the regulating element bring about vehicle deceleration operations during reversing.

The driver can execute a changeover between the forward driving mode and the manoeuvring mode not only when the vehicle is standing, but also when the vehicle is driving along. In the latter case, suitable transitional measures for the effect of the regulating element during such changes of the driving mode must be provided on account of the different operating functionalities of the regulating element 2 in the forward driving mode, on the one hand, and in the manoeuvring mode, on the other hand. Some possible measures are illustrated by way of example in Figures 4 to 6, these diagrams plotting by way of example the respective value of the throttle-flap angle S as a function of the regulating element deflection A or as a function of time t and assuming a system design with a passive regulating element 2.

Figure 4 illustrates diagrammatically the different profile of the throttle-flap angle S as a function of the regulating element deflection A in the forward driving mode, on the one hand, described by the characteristic K_3 represented by an unbroken line, in comparison with that in the manoeuvring mode, described by the characteristic K_4 represented by a dot-and-dashed line. As is evident from this, with an increasing regulating element deflection A the throttle-flap angle rises more steeply in the forward driving mode than in the manoeuvring mode, so that, in the

manoeuvring mode, with the regulating element fully deflected, the throttle flap is not opened completely and the vehicle speed remains below the maximum vehicle speed. Thus, for any given regulating element deflection A, different throttle-flap angle values are obtained for the forward driving mode, on the one hand, and the manoeuvring mode, on the other hand.

Figure 5 illustrates a first possibility of the system design for taking into account these different control variable values in the various driving modes by means of a changeover from the manoeuvring mode to the forward driving mode. In this design, when there is a change between the driving modes, a change is made from the previous control variable value to the new control variable value which, in each case, is instantaneous, that is to say in the manner of a jump. Where Figure 5 is concerned, this means that, at a changeover time t_c, there is an instantaneous jump from the hitherto maximum possible throttle-flap angle value for the manoeuvring mode to the full throttle-flap opening possible in the forward driving mode.

If critical situations were to arise as a result of such an instantaneous transition behaviour in the case of high engine power, it is possible to select one of the system designs which are illustrated in Figure 6, once again by means of a changeover from the manoeuvring mode to the forward driving mode, and by means of which a transition is made from the previous control variable value to the new control variable value gradually along a continuous transition characteristic. Figure 6 illustrates by way of example three possible transition characteristics of this type, specifically a linear characteristic K_5 represented by a broken line, a convexly rising characteristic K_6 represented by an unbroken line and a concavely rising characteristic K_7 represented by dashes and double dots. In this type of gradual change in the control variable value, the full vehicle acceleration capacity during the transition

is dispensed with in favour of a less critical driving behaviour.

Preferably, a kick-down function is additionally provided for the regulating element 2, as illustrated diagrammatically in Figure 7. In this kick-down function, full throttle-flap opening is set quickly and, if appropriate, a lower gear is additionally selected, in order to obtain maximum vehicle acceleration. Since this function is to be capable of being activated only in the forward driving mode and not in the manoeuvring mode, there is provided a mechanical stop not shown which, in the manoeuvring mode, limits the maximum regulating element deflection in the forward direction to a predetermined manoeuvring mode maximum deflection A_{Mm}. By contrast, in the forward driving mode, this stop allows a further regulating element deflection up to a higher maximum deflection value A_m. However, for this additional deflection, increased resistance is provided for the regulating element 2, for example by means of an additional return spring, so that the driver detects the activation of the kick-down function via his hand which actuates the regulating element 2. As an alternative, if required, the kick-down function may, of course, also be triggered by actuating an additional operating element provided for this purpose.

Similar transitional and additional functions for the regulating element 2, such as were described above in relation to Figures 4 and 7, can also be implemented in a similar way for all other possible system designs, for example if the longitudinal acceleration of the vehicle is selected, instead of the throttle-flap angle, as a control variable S, or if, in the case of an active or isometric design of the regulating part, the actuating force on the regulating element is selected, instead of the regulating element deflection, as the critical regulating element actuation variable, no problems as regards the feedback function arising in the case of an active design of the regulating part. If, in an active design of the regulating

part, the regulating element deflection serves as a critical actuation variable and a reaction force serves as a feedback variable, similar transition measures to those described with regard to Figures 4 to 6 may be used. In this case, for example, the instantaneous fuel consumption, for example recognized from the throttle-flap position, if the throttle-flap angle serves as a control variable, also comes under consideration, in addition to the longitudinal acceleration of the vehicle, as a feedback variable linked to the reaction force. If, in the case of an active design of the regulating part, the vehicle speed is set by means of the regulating element deflection, the feedback reaction force may, for example, be selected in proportion to the difference between the desired speed and actual speed. Then, during the changeover between the driving modes, first only the desired speed changes noticeably, thus resulting, without countermeasures, in a corresponding jump of the feedback reaction force which jump may, as required, be maintained in this way or else be mitigated by means of a gradual transition.

The exemplary embodiments described show that the device according to the invention allows a control of the longitudinal movement of the motor vehicle by the driver with high operating comfort. It goes without saying that the regulating element used for this purpose may, if required, also be used additionally for controlling the transverse movement of the vehicle, if the said regulating element is extended, for this purpose, by a further actuating plane, for example in the transverse direction of the vehicle, as is customary per se for many regulating elements of this type. At all events, it is characteristic of the motor vehicle according to the invention that no separate transmission gear selector lever has to be actuated in the manoeuvring mode for the change between forward driving and reversing.

Claims

1. A device for controlling the longitudinal movement of a motor vehicle, with a user-actuable regulating element, by means of which the longitudinal movement of the vehicle is controllable with both an accelerating and a decelerating effect, wherein

- a forward driving mode and a manoeuvring mode are provided as selectable driving modes for the motor vehicle, the vehicle
- in the forward driving mode being capable of being moved solely forwards and, when the regulating element is actuated in a first direction of actuation, being accelerated to an extent dependent on the deflection of or actuating force applied to the regulating element and, when the regulating element is actuated in a second direction of actuation, being decelerated to an extent dependent on the deflection of or actuating force applied to the regulating element, and
- in the manoeuvring mode, being capable of being moved forwards when the regulating element is actuated in one direction of actuation and of being moved backwards when the latter is actuated in the other direction of actuation.

2. A device according to Claim 1, wherein, in the manoeuvring mode, the vehicle speed is set as a function of the deflection or actuating force of the regulating element between zero and a predeterminable maximum manoeuvring speed amount lower than the maximum vehicle speed in the forward driving mode.

3. A device according to Claim 1 or 2, wherein, in the manoeuvring mode, a standing brake function is activated in the respective direction of actuation of the regulating element in the event of deflections of or actuating forces applied to the regulating element up to a predeterminable minimum deflection or minimum actuating force.

4. A device according to any one of Claims 1 to 3, wherein a reversing mode is provided as a further selectable driving mode, in which the vehicle can be moved solely backwards and, when the regulating element is actuated in one direction of actuation, is accelerated to an extent dependent on the deflection of or actuating force applied to the regulating element and, when the regulating element is actuated in the other direction of actuation, is decelerated to an extent dependent on the deflection of or actuating force applied to the regulating element.

5. A device according to any one of Claims 1 to 4, wherein, to control the longitudinal movement of the vehicle by means of the user-actuable regulating element, the throttle-flap angle or the braking force, the acceleration or deceleration or the speed of the vehicle are set as a control variable as a function of the deflection of or actuating force applied to the regulating element, with the aid of characteristics which are predetermined as being steeper for the forward driving mode than for the manoeuvring mode.

6. A device according to Claim 5, wherein, during the changeover between the forward driving mode and the manoeuvring mode, the transition is made instantaneously or gradually according to a predetermined transition characteristic from the previous value to the new value of the driving dynamics control variable influenced by the actuation of the regulating element.

7. A device for controlling the longitudinal movement of a motor vehicle, substantially as described herein with reference to, and as illustrated in, the accompanying drawings.

Amendments to the claims have been filed as follows

Claims

1. A device, incorporated in a motor vehicle, adapted to control the longitudinal movement of said motor vehicle, with a user-actuable regulating element, by means of which the longitudinal movement of the vehicle is controllable with both an accelerating and a decelerating effect, wherein

- a forward driving mode and a manoeuvring mode are provided as selectable driving modes for the motor vehicle, the vehicle
- in the forward driving mode being capable of being moved solely forwards and, when the regulating element is actuated in a first direction of actuation, being accelerated to an extent dependent on the deflection of or actuating force applied to the regulating element and, when the regulating element is actuated in a second direction of actuation, being decelerated to an extent dependent on the deflection of or actuating force applied to the regulating element, and
- in the manoeuvring mode, being capable of being moved forwards when the regulating element is actuated in one direction of actuation and of being moved backwards when the latter is actuated in the other direction of actuation.

2. A device according to Claim 1, wherein, in the manoeuvring mode, the vehicle speed is set as a function of the deflection or actuating force of the regulating element between zero and a predeterminable maximum manoeuvring speed amount lower than the maximum vehicle speed in the forward driving mode.

3. A device according to Claim 1 or 2, wherein, in the manoeuvring mode, a standing brake function is activated in the respective direction of actuation of the regulating element in the event of deflections of or actuating forces applied to the regulating element up to a predeterminable minimum deflection or minimum actuating force.

4. A device according to any one of Claims 1 to 3, wherein a reversing mode is provided as a further selectable driving mode, in which the vehicle can be moved solely backwards and, when the regulating element is actuated in one direction of actuation, is accelerated to an extent dependent on the deflection of or actuating force applied to the regulating element and, when the regulating element is actuated in the other direction of actuation, is decelerated to an extent dependent on the deflection of or actuating force applied to the regulating element.

5. A device according to any one of Claims 1 to 4, wherein, to control the longitudinal movement of the vehicle by means of the user-actuable regulating element, the throttle-flap angle or the braking force, the acceleration or deceleration or the speed of the vehicle are set as a control variable as a function of the deflection of or actuating force applied to the regulating element, with the aid of characteristics which are predetermined as being steeper for the forward driving mode than for the manoeuvring mode.

6. A device according to Claim 5, wherein, during the changeover between the forward driving mode and the manoeuvring mode, the transition is made instantaneously or gradually according to a predetermined transition characteristic from the previous value to the new value of the driving dynamics control variable influenced by the actuation of the regulating element.

7. A device, incorporated in a motor vehicle, adapted to control the longitudinal movement of said motor vehicle, substantially as described herein with reference to, and as illustrated in, the accompanying drawings.

The Patent Office

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Application No:	GB 9713446.4	**Examiner:**	Robert Crowshaw
Claims searched:	1 to 7	**Date of search:**	17 September 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F2Y (YCB, YCC, YCE, YCL, YTA, YTB)

Int Cl (Ed.6): A61F 4/00; B62D 1/02, 1/12, 1/22; G05G 1/14, 1/20, 9/00, 9/02, 9/04, 9/047; G06K 11/18

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2244742 A	(SCHMIDT) Note the joystick control buttons in figure 16 which change the function controlled by the joystick.	1
X	WO 91/06903 A1	(CATERPILLAR) Note the transversely actuable vehicle control mechanism 10 in figure 1 having a switch 100 for forward, neutral and reverse modes.	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.